COMBINATION DEVICE WITH **ADHESIVE** FASTENERS HAVING RIB AND GROOVE TRACKS

Technical Field

The present invention relates, in general, to fasteners having rib and groove tracks to close and seal bags by alternate engagement of the tracks and, more particularly, to a fastening device with **adhesive** fasteners having rib and groove tracks which closes and seals various containers, such as bags, by the fasteners provided on corresponding surfaces and by a predetermined engaging force between the rib and groove tracks, thus being convenient to use, and providing a slim structure.

Background Art

Plenty of techniques that relate to zipper type bags to store therein various contents have been proposed throughout the world.

In a mechanism of engagement of rail and channel elements which are arranged on opposite inner surfaces of a bag in a latitudinal direction of the bag, although the rail and channel elements are made of low density polyethylene (LDPE), the rail and channel elements are very hard and stiff. Thus, this mechanism is very different from a structure in which an opening is simply opened and closed.

Furthermore, the engagement of the rail and channel

elements requires pressure, and the method of decoupling them is forcible. Therefore, great force is necessary to open and close the bag. In the case of an old or feeble person or child whose grip is week, difficulty in handling it exists. For all that, a flexible material cannot be used for the rail and channel elements, because the engagement ability is reduced as time goes on so that the intrinsic value of the product is deteriorated.

To solve the above-mentioned problems, bags having slide fasteners have been proposed. However, because manufacturing costs are increased due to a complex manufacturing process, these bags are limitedly used only for special purposes.

The rail and channel elements are attached to the opposite surface of a bag by line-welding in a state of being engaged with each other. Even though the rail and channel elements become thin when being attached in the state of being engaged with each other, both ends of the rail and channel elements, which are made of a great amount of resin and are about 1.6 to 1.8mm in thickness, must be thicker than the bag which is made of a film material having about 0.05 to 0.12mm thickness. Thus, fatigue occurs in both ends of the engagement part of the rail and channel elements. Accordingly, both ends of the engagement part may burst during use.

To overcome this problem, bags in which both ends of engagement parts are surface-welded have been proposed. However, aside from increasing manufacturing costs due to the complex process, this is not a very different solution. Thus, if such a bag is used over a predetermined period, bursting still occurs.

The engagement of the rail and channel elements requires physical deformation during use. Furthermore, even though the rail and channel elements tightly engage with each other, a gap between them occurs with use over a long period.

In the conventional zipper type bags, because the rail and channel elements are forcibly attached to and detached from each other by physical deformation by the strength of a user's hands, rigid material cannot be used to make the elements.

Therefore, in the case wherein a bag is integrally formed through an extrusion molding process, selection of a film material is limited. Low density polyethylene (LDPE) is mainly used as the bag material throughout world. However, such a bag has serious problems in which an opening is not easily opened and closed in spite of the soft material, and the bag is not completely transparent.

Furthermore, when the rail and channel elements are welded to the bag made of a composite film material, a predetermined time is required to increase the temperature of a junction between the elements and the bag, thus reducing the manufacturing speed, thereby deteriorating productivity. As well, the appearance of the bag is not good, and the bag may be undesirably rumpled, thus deteriorating the quality of the product.

In materials for the bag film, there is an oriented polypropylene (OPP) having superior transparency and a thickness of about 30 to 50 μm. This has the advantage of revealing the contents of the bag. Thus, every year, demand for this is increasing. Furthermore, this is used for header-type and glue-

type bags to make them graceful and convenient.

In other words, the header-type bags (a hole is formed on a header side so that it is hooked onto a hook, and an opening, to which an adhesive agent is applied, is formed on an opposite side to allow the entrance and exit of contents) are used to receive therein stationery, various kinds of accessories, articles for display, small manufacturing industry products, and fancy products, etc. The glue-type bags are used to receive therein clothes, such as shirts and sportwear, bread, etc.

In the above-mentioned bags, because the adhesive agent is applied to an outer surface of the opening or an inner surface of a flap, a separate bonding agent is unnecessary. Thus, a user can easily close or open the bag with little force.

However, the conventional bags have following several disadvantages.

The conventional bags each have a liner to protect the adhesive agent prior to use. Therefore, to use the bag, the user must detach the liner from the bag, thus causing inconvenience to the user. As well, the liner increases the manufacturing costs of the product.

Furthermore, because the adhesive agent is exposed to the outside, when a user puts contents in the bag or takes them out, the adhesive agent is contaminated due to impurities and the hands of the user. Although the adhesive agent has a high adhesive strength, the adhesive ability of the contaminated adhesive agent is decreased. Thus, repeated openings and closures may be limited. If an adhesive agent having a higher adhesive strength is used to

increase the number of openings and closures during use, whenever the user puts contents in the bag or takes them out, the hand of the user becomes sticky due to the adhesive agent.

Recently, due to a variety of life styles, tray-type containers are gaining popularity to store various small contents. However, most of small contents are stored in the zipper-type bags.

Article bags to store large clothes, food bags to store large vegetables, and garbage bags to receive and carry garbage are made of a high density polyethylene which does not easily tear and has a high tensile strength and a thickness of about 50 to 100 μm.

Such bags each have pairs of band closures at predetermined opposite positions. However, if contents are received in the bag above a predetermined level, it becomes difficult to close the bag. If the user forcibly pulls and ties the band closures, the band closures may tear. Therefore, the user closes the bag in which the contents are less than the predetermined level. Alternatively, the user disregards the characteristic function of the band closures, and puts excessive contents in the bag and closes the bag using a separate adhesive tape.

In disposable objects, such as diapers, reusable adhesive band closures are used. Typically, such adhesive band closures have structures such that a predetermined amount of adhesive agent is applied to a planar tape.

However, in the case wherein the adhesive agent is contaminated by the impurities and the hands of a user after a

liner is detached from the planar tape, the adhesive band closures cannot be reused.

Disclosure of the Invention

The present invention satisfies the recent way of thinking centered on consumers to meet the needs of the consumers according to the lifestyle changes of the consumers, and has been made keeping in mind the above problems occurring in the prior art, and allows openings of various containers, such as bags, to be easily opened and closed and allows engaging parts of a fastening device to be simply controlled.

An object of the present invention is to provide a fastening device with **adhesive** fasteners having rib and groove tracks in which the rib and groove tracks are provided at predetermined positions on a container, such as a bag, or an engaging part of a bag, so that the rib and groove tracks alternately engage with and adhere to each other by an adhesive agent, thus serving as the fastener, and which does not require forcible engagement and disengagement and prevents the adhesive agent from being exposed to impurities, thus being convenient to use, and firmly executing the intrinsic roles.

In order to accomplish the above object, in the present invention, a predetermined amount of adhesive agent having a predetermined adhesive strength is evenly applied only to groove tracks of each of a pair of fasteners corresponding to each other, so that the groove track alternately and reliably engages with an

associated rib track.

Brief Description of the Drawings

FIG. 1 is a partially broken perspective view of a bag integrated with a fastening device according to a first embodiment of the present invention;

FIG. 2a is a sectional view showing an enlargement of an important part of the integrated-type fastening device of FIG. 1 in a state in which the bag is open;

FIG. 2b is a sectional view showing an enlargement of the important part of the integrated-type fastening device of FIG. 1 in a state in which the bag is closed;

FIG. 3 is a perspective view showing an enlargement of a part of a bag having a soft-touch type fastening device according to a modification of the first embodiment of present invention;

FIG. 4 is a sectional view showing an enlargement of an important part of the soft-touch type fastening device of FIG. 3;

FIG. 5 is a perspective view showing an enlargement of a part of a bag having a fastening device according to another modification of the first embodiment of the present invention;

FIG. 6a is a view showing the operation of a fastening device having a basic structure according to the present invention;

FIG. 6b is a view showing the operation of a fastening device according to the present invention in which welding assistant blades extend from predetermined positions on fasteners

which are spaced apart from reverse action reference points by widths (d1);

FIG. 6c is a view showing the operation of a fastening device according to the present invention in which welding assistant blades extend from predetermined positions on fasteners which are spaced apart from reverse action reference points by widths (d2);

FIG. 6d is a view showing operation of a fastening device according to the present invention in which welding assistant blades extend from predetermined positions of fasteners which are spaced apart from reverse action reference points by widths (d1) and (d3);

FIG. 7 is a perspective view showing an opened state of a bag integrated with a fastening device according to a second embodiment of the present invention;

FIG. 8 is a perspective view of a closed state of the bag having the fastening device according to the second embodiment of the present invention;

FIG. 9 is a sectional view showing an enlargement of an important part of the integrated-type fastening device of the closed bag of FIG. 8;

FIG. 10 is a perspective view showing a bag having a press-fit type fastening device according to a third embodiment of the present invention;

FIG. 11 is a sectional view showing an enlargement of an important part of the press-fit type fastening device of the closed bag of FIG. 10;

FIG. 12a is an enlarged sectional view of a fastening device having a single engagement structure according to the present invention;

FIG. 12b is an enlarged sectional view of a fastening device having a double engagement structure according to the present invention;

FIG. 12c is an enlarged sectional view of a fastening device having a triple engagement structure according to the present invention;

FIG. 12d is an enlarged sectional view of a fastening device having a quadruple engagement structure according to the present invention;

FIG. 13a is an enlarged sectional view showing a fastener having integrated tracks adhered to a surface using double-sided adhesive tape according to the present invention;

FIG. 13b is an enlarged sectional view showing a fastener provided by adhering independent tracks to a surface using two thicknesses of double-sided adhesive tape according to the present invention;

FIG. 14a is an enlarged sectional view showing a fastener having integrated tracks welded to a surface according to the present invention;

FIG. 14b is an enlarged sectional view of a fastener which is provided by extending welding assistant blades outwards from the fastener of FIG. 14a;

FIG. 14c is an enlarged sectional view showing a fastener provided by adhering independent tracks to a surface by welding

according to the present invention;

FIG. 15 is an enlarged sectional view of a fastener having press-fit type tracks according to the present invention;

FIG. 16 illustrates how an adhesive part of a fastener of the present invention is prevented from being contaminated;

FIGS. 17a, 17b and 17c are sectional views of fasteners having rectangular, trapezoidal and rounded cross-sections, respectively, according to the present invention;

FIG. 18 is a perspective view showing an enlargement of a part of a fastener, in which grooves are formed on tracks according to the present invention;

FIG. 19a is an enlarged sectional view of a part of a fastener having a side-furrow type groove according to the present invention;

FIG. 19b is an enlarged sectional view of a part of a fastener having a vertical-furrow type groove according to the present invention;

FIG. 20 is a perspective view showing an enlargement of part of a fastener, in which a bottom surface of a groove track is uneven according to the present invention;

FIG. 21 is an enlarged sectional view of a part of a fastener having linear grooves on a bottom surface of a groove track according to the present invention;

FIG. 22a is a plan view showing a track having rectangular grooves according to the present invention;

FIG. 22b is a plan view showing a track having rhombic grooves according to the present invention;

FIG. 22c is a plan view showing a track having circular grooves according to the present invention;

FIG. 22d is a plan view showing a track having a waved uneven surface according to the present invention;

FIG. 23 is a perspective view showing an opened state of a bag having a band-type fastening device according to a fourth embodiment of the present invention;

FIG. 24 is view to illustrate the engagement of fasteners of the band-type fastening device of FIG. 23;

FIG. 25 is an enlarged sectional view taken along the line A-A of FIG. 24 to show the engagement of the fasteners of the band-type fastening device;

FIG. 26a is a plan view of a band-type fastener having circular cells according to the present invention;

FIG. 26b is a plan view of a band-type fastener having rectangular cells according to the present invention; and

FIGS. 27a and 27b are enlarged sectional views taken along the lines Y-Y and X-X of FIG. 26a, respectively, when the fastener of FIG. 26a engages with another fastener.

Best Mode for Carrying Out the Invention

Hereinafter, embodiments of the present invention will be described in detail with reference to the accompanying drawings.

The following embodiments are examples to explain the fastening device with **adhesive** fasteners having rib and groove tracks, but do not limit the scope of the present invention.

As shown in FIGS. 1, 3 and 5, a fastening device with **adhesive** fasteners having **a gear-shaped** rib and groove tracks according to a first embodiment is provided on an openable bag.

As shown in FIG. 1, integrated-type fasteners 30 and 20 of the present invention are respectively provided around an opening 16 on opposite inner surfaces of front and rear films 12 and 13 of the openable bag 10. The openable bag 10 is manufactured by overlapping two flat synthetic resin films, made through air extrusion molding processes, and by sealing both sides 14 and 15 of the overlapped films by line-welding. Alternatively, a lower end as well as both sides 14 and 15 of the overlapped films may be sealed by line-welding, thus forming the openable bag 10.

The fastener 20 on the first inner surface includes at least two rib tracks 25a and 25b which have a predetermined width and height and are arranged in a latitudinal direction of the openable bag 10, and at least one groove track 23 which is provided between the rib tracks 25a and 25b and has a width and depth that corresponds to the width and height of rib tracks 35a and 35b of the fastener 30 provided on the second inner surface.

A predetermined amount of adhesive agent 27 having a predetermined adhesive strength is evenly applied to a bottom surface of the groove track 23, so as to help the groove track 23 engage with one of the rib tracks 35a or 35b of the fastener 30.

The fastener 30 is provided at a predetermined position on the second inner surface of the openable bag 10 while being placed above or below the position of the fastener 20 by the width of one track. The fastener 30 includes at least two rib tracks 35a and

35b and at least one groove track 33 which are provided on the fastener 30 in the same manner as those of the fastener 20. Thus, the rib tracks 35a and 35b and the groove track 33 of the fastener 30 engage with the rib tracks 25a and 25b and the groove track 23 of the fastener 20 to form a double fastening structure.

Alternatively, one rib track 35 may be provided on the second inner surface to correspond to the groove track 23 of the fastener 20 provided on the first inner surface (see, FIG. 12a), so that the rib track 35 engage with the groove track 23 on the first inner surface to form a single fastening structure.

As shown in FIGS. 3 and 5, in welding-type fasteners 20s and 30s, an openable bag 10 is manufactured by overlapping two flat composite films, made of a predetermined material appropriate to the contents to be stored in the openable bag 10, and by sealing a left side (not shown), a right side 15s and a lower end (not shown) of the overlapped films by surface-welding. The welding-type fasteners 30s and 20s of the present invention are respectively provided around an opening 16 on fastener welding regions 37a, 37b, 57a, 57b of opposite inner surfaces of front and rear films 12 and 13 of the openable bag 10.

As shown in FIGS. 3, 5 and 14b, the fasteners 20s and 30s each include welding assistant blades 77a, 77b, 87a and 87b which have predetermined widths and extend outwards from lower ends of both sides of the fastener 20s, 30s on the first and second inner surfaces. Alternatively, the welding assistant blade 77a, 77b, 87a, 87b may extend outwards from a predetermined position of a rear surface of each of the fasteners 20s and 30s which is spaced

inward from a lower end of one side of the fastener 20s, 30s.

The welding-type fasteners 20s and 30s are classified into fasteners 20g and 30g having basic structures in which their rear surfaces are planar as shown in FIGS. 6a and 14b, soft-touch type fasteners 20t and 30t and reverse- opening preventing type fasteners 20r and 30r, rear surfaces of which are not planar according to modifications of the preferred embodiment as shown in FIGS. 4, 6b, 6c and 6d.

As shown in FIGS. 3 and 4, in each of the soft-touch type fasteners 20t and 30t, a depression is provided such that the rear surface of the fastener 20t, 30t other than the welding assistant blades 77a, 77b, 87a and 87b is prevented from being in direct contact with an associated surface of each of the films 12 and 13 of the bag 10. To achieve this purpose, at least one support ridge 21a, 21b, 31a, 31b having a predetermined size is provided at a central portion in the depression, thus forming an air capsule 22, 23 in the depression.

As shown in FIGS. 5, 6b, 6c and 6d, in the reverse-opening preventing type fasteners 20r and 30r, the welding assistant blades 77b and 87b extend to predetermined lengths from predetermined positions which are spaced inward from reverse action reference points (SR) of the rear surfaces of the fasteners 20r and 30r by integer multiples (d1~dx) of the width of each of the tracks, respectively. The welding assistant blades 77a and 87a extend from forward action reference points (SI) of the rear surfaces of the fasteners 20r and 30r, respectively.

As shown in FIGS, 7 through 9, a fastening device with

predetermined width, depth and length are provided at predetermined positions on the outer edge of the lower tray 65 to form a U-shaped or rectangular-shaped structure. A rib track 25 is provided between the groove tracks 23a and 23b and has a predetermined width, height and length that respectively correspond to the width, depth and length of the groove track 33 of the upper tray 64.

A predetermined amount of adhesive agent 27 having a predetermined adhesive strength is evenly applied to a bottom surface of each of the groove tracks 23a and 23b, so as to help the groove tracks 23a and 23b engage with rib tracks 35a and 35b of the upper tray 64.

To provide the fastener 30 on the upper tray 64, at least two rib tracks 35a and 35b and at least one groove track 33 are provided in the same manner as those of the lower tray 65 at a predetermined position on the upper tray 64 which corresponds to the U-shaped or rectangular-shaped fastener 20 provided on the lower tray 65 when the upper tray 64 having a predetermined rotation radius is folded onto the lower tray 65. Thus, the fastener 30 engage with the rib track 25 and the groove track 23a and 23b of the lower tray 65 to form a triple fastening structure.

In the drawings, the reference numeral 67 denotes a leading part.

FIGS. 12a, 12b, 12c and 12d illustrate that the fastening strength of the pair of fasteners engaging with each other can be changed by changing the number of rib and groove tracks.

In the fastening device of the present invention of FIG.

12a, two rib tracks 25a and 25b and one groove track 23 are provided on a lower surface 79 to provide a fastener, and only one rib track 35 is provided on an upper surface 78 to provide another fastener. Thus, the fasteners engaging with each other form a single fastening structure.

In the fastening device of the present invention of FIG. 12b, two rib tracks 25a and 25b and one groove track 23 are provided on a lower surface 79 to provide a fastener, and two rib tracks 35a and 35b and one groove track 33 are provided on an upper surface 78 to provide another fastener. Thus, the fasteners engaging with each other form a double fastening structure.

In the fastening device of the present invention of FIG. 12c, two rib tracks 25a and 25b and one groove track 23 are provided on a lower surface 79 to provide a fastener, and three rib tracks 35a, 35b and 35c and two groove tracks 33a and 33b are provided on an upper surface 78 to provide another fastener. Thus, the fasteners engaging with each other form a triple fastening structure.

In the fastening device of the present invention of FIG. 12d, three rib tracks 25a, 25b and 25c and two groove tracks 23a and 23b are provided on a lower surface 79 to provide a fastener, and three rib tracks 35a, 35b and 35c and two groove tracks 33a and 33b are provided on an upper surface 78 to provide another fastener. Thus, the fasteners engaging with each other form a quadruple fastening structure.

Here, a predetermined amount of adhesive agent 27 having a predetermined adhesive strength is evenly applied to a bottom

surface of each of the groove tracks 23 and 33. Therefore, when the groove tracks 23 and 33 engage with the associated rib tracks 25 and 35, an adhesive fastening structure is provided.

FIGS. 13a, 13b, 14a, 14b and 14c illustrate that fasteners can be provided on various kinds of base sheets 70 by various methods according to the properties of the base sheets 70.

The base sheets 70 can be made of many kinds of materials, such as synthetic resin, paper, fabric, animal hide or latex.

FIG. 13a illustrates a fastener 20 of the present invention having two integrated rib tracks 25a and 25b and one groove track 23, adhered to a base sheet 70 using a two-sided adhesive tape 72.

FIG. 13b shows a method in which two independent rib tracks 25a and 25b are adhered to a base sheet 70 using double two-sided adhesive tape 75 while being spaced apart from each other by the width of each rib track 25a, 25b, thus forming a groove track 23 between them. Preferably, the double two-sided adhesive tape 75 includes both surfaces having different features, in which a rear surface 74 of the double two-sided adhesive tape 75 adhered to the base sheet 70 comprises a permanently adhesive surface, and a front surface 73 of the double two-sided adhesive tape 75 serving as the groove track 23 comprises a resealable surface.

That is, the adhesive strength of the front surface 73 serving as a fastener 20s, 30s is weaker than that of the rear surface 75 which permanently adheres to the base sheet 70.

The double two-sided adhesive tape 75 may comprise a reusable double-sided adhesive tape made and marketed by the 3M Company.

FIG. 14a illustrates that a fastener 20s of the present invention having two integrated rib tracks 25a and 25b and one groove track 23 is attached to a base sheet 70 by supersonic, high-frequency or heat welding.

A method shown in FIG. 14b is similar to that of FIG. 14a, but in which welding assistant blades 77a and 77b extend outwards from lower ends of outer surfaces of rib tracks 25a and 25b, thus increasing an adhesive strength.

FIG. 14c illustrates two independent rib tracks 25a and 25b adhered to a base sheet 70 by welding and spaced apart from each other by the width of each rib track 25a, 25b, thus forming a groove track 23 between them and, in addition, an adhesive agent 27 applied to a predetermined region of a surface of the base sheet 70.

FIG. 15 illustrates a synthetic resin film sheet having a predetermined thickness and a plate shape being made through a press-molding process, thus integrally forming both rib tracks 25a and 25b and a groove track 23.

As shown in FIG. 18, in a fastener having both rib tracks 25a and 25b and a groove track 23 according to the present invention, when an adhesive agent 27 is applied to a bottom surface of the groove track 23, the adhesive agent 27 may overflow outside the groove track 23 according to the density thereof. To prevent this, the fastener of FIG. 18 has grooves formed at predetermined positions.

FIG. 19a is an enlarged sectional view of a part of a fastener according to the present invention to show side-furrow

type grooves 24a and 24b which are respectively formed on lower ends of opposite inner surfaces of rib tracks 25a and 25b.

FIG. 19b is an enlarged sectional view of part of a fastener according to the present invention showing vertical-furrow type grooves 26a and 26b which are respectively formed on lower ends of opposite inner surfaces of rib tracks 25a and 25b.

In a fastener shown in FIG. 20 having two rib tracks 25a and 25b and one groove track 23 according to the present invention, to enhance the [weatherability] **weathering resistance** of the fastener by increasing an adhesive strength of an adhesive agent 27 applied to a bottom surface of the groove track 23, the bottom surface of the groove track 23 has an uneven surface.

FIG. 21 is a sectional view of a part of a fastener having linear grooves 71a to form a striped surface as an example of the above-mentioned uneven surface.

FIGS. 22a, 22b, 22c and 22d show other examples of the uneven surface. FIG. 22a shows a surface having rectangular grooves 71b. FIG. 22b shows a surface having rhombic grooves 71c. FIG. 22c shows a surface having circular grooves 71d. FIG. 22d shows a surface having wavy lines 71e.

As shown in FIG. 23, a fastening device with fasteners having a plurality of rib and groove tracks according to a fourth embodiment is provided on a band closure type bag.

The band closure type bag 80 is manufactured by sealing a lower end 82 of a synthetic resin tubular film, which is made through an air extrusion molding process, by line-welding. Two pairs of band closures 83, 85, 84 and 86 are provided at opposite

positions around an opening 87 formed in an upper end of the band closure type bag 80. Band-type fasteners 93, 96, 94 and 95 are respectively provided on inner surfaces of the band closures 83 and 86 facing towards the outside and outer surfaces of the band closures 84 and 85 facing towards the inside, when overlapped.

Each of the band-type fasteners 83 and 86, which are respectively provided on the inner surfaces of the band closures 83 and 86, when overlapped facing towards the outside, includes a plurality of rib tracks 25a-z which are longitudinally arranged and which each have a predetermined width, height and length. Each band-type fastener 83, 86 further includes a plurality of groove tracks 23a-z, provided between the rib tracks 25a-z, each having a width, depth and length that respectively correspond to the width, height and length of each of a plurality of rib tracks 35a-z provided on each of the band closures 84 and 85.

A predetermined amount of adhesive agent 27 having a predetermined adhesive strength is evenly applied to the bottom surface of each of the groove tracks 23a-z, so as to help the groove tracks 23a-z engage with the rib tracks 35a-z.

Each of the band-type fasteners 83 and 86, respectively provided on the inner surfaces of the band closures 83 and 86, when overlapped facing towards the outside, includes a plurality of rib tracks 25a-z which are longitudinally arranged each having a predetermined width, height and length. Each band-type fastener 83, 86 further includes a plurality of groove tracks 23a-z, provided between the rib tracks 25a-z, each having a width, depth and length that respectively correspond to the width, height and

length of each of a plurality of rib tracks 35a-z provided on each of the band closures 84 and 85.

To provide the band-type fasteners 94 and 95 on the outer surfaces of the band closures 84 and 85, when overlapped, facing towards the inside, the plurality of rib tracks 35a-z and a plurality of groove tracks 33a-z are provided on predetermined portions of the band closures 84 and 85 in the same manner as those for providing the band-type fasteners 93 and 96. Thus, rib tracks 35a-z and groove tracks 33a-z of the band-type fasteners 94 and 95 engage with the rib tracks 25a-z and groove tracks 23a-z of the band-type fasteners 93 and 96, when overlapped, facing towards the outside, thus forming a multiple fastening structure.

In FIGS. 26a and 26b, band-cell type **adhesive** fasteners having rib and groove cells according to modifications of the fourth embodiment are shown.

In each of the band-cell type fasteners 100, a plurality of rib cells 105 and a plurality of groove cells 103 are provided on the surface of a band base 107.

The rib cells 105 each having a predetermined size, height and shape (circular, rectangular or rhombic shape, etc.) are spaced apart from each other at predetermined intervals. Predetermined regions of the band base 107 other than the rib cells 105 become the groove cells 103.

A predetermined amount of adhesive agent 27 having a predetermined adhesive strength is evenly applied to a bottom surface of each of the groove cells 103, so as to help the groove cells 103 engage with the rib cells 105 of a corresponding band-

cell type fastener 100, thus forming a multiple fastening structure (because the band-cell type fasteners 100 provided on first and second surfaces have the same structure, they are not distinguished in the drawings; only sectional views are shown).

In the fastening device of the present invention having the above-mentioned structure, as shown in FIG. 2a, when a user holds and opens lip parts 17a and 17b of the openable bag 10 with his/her hands, the groove track 23 of the fastener 20 provided on the first inner surface disengages from the upper or lower rib track 35a or 35b of the fastener 30 provided on the second inner surface. It has been previously decided which rib track 35a or 35b to join the groove track 23 to. Simultaneously, the groove track 33 on the second inner surface disengages from the upper or lower rib tracks 25a or 25b of the fastener 20 provided on the first inner surface. Likewise, it has been previously decided which rib track 25a or 25b to join the groove track 33 to. As such, the openable bag 10 is opened.

Various kinds of adhesive agents 27 having different adhesive strengths can be applied to each of the groove tracks 23 and 33 according to the purpose of the openable bag 10. That is, in the present invention, the adhesive agent 27 is selected according to peeling strength thereof being in proportion to the adhesive strength.

As shown in FIG. 2b, to close the opened bag 10, the user softly holds a left or right end of the fastening device having the fasteners 20 and 30 with his/her fingers and slides his/her fingers along the fastening device in a predetermined direction.

Because the fasteners 20 and 30 do not protrude from an outer surface of the openable bag 10, the user can smoothly slide his/her fingers without pain due to friction. As well, because it is unnecessary to forcibly press the fastening device, an old or feeble person or child also can easily close and perfectly seal the openable bag 10.

Furthermore, the present invention does not require a separate slide which increases manufacturing costs and is inefficient in practice.

The fastening device of the present invention is characterized in that various peeling strengths can be achieved according to the adhesive strength of the adhesive agent and, in addition, a perfect fastening ability is secured despite a very slim structure. As such, the present invention has superior ability, compared with conventional zipper-type bags in which a junction of rail and channel elements must be physically deformed by a predetermined force to open or close a bag.

If conventional bags are classified into zipper-type bags and glue-type bags, special characteristics of the two cases are certainly different.

In a detailed description, in the case of the zipper-type bags, the fastening ability is superior, but a greater force is required to open or close a bag. In the case of the glue-type bags, it is easy to open or close a bag, but the seal is weaker and, as well, because an adhesive agent applied to a predetermined portion of the bag is exposed to the outside, reusability of the adhesive agent is limited due to frequent contact with impurities

and hands of a user.

However, the bag 10 having the fastening device of the present invention exhibits only the advantages of the above-mentioned representative examples of conventional bags, thus being more convenient.

In detail, the fastening method of the present invention using an adhesive agent exhibits superior fastening ability despite having smooth opening and closing performance. Furthermore, if the bag contents are not fine powder or fluid of a predetermined viscosity, because a bottom surface of a groove track 23, 33 to which an adhesive agent is applied is formed at a position lower than surfaces of associated rib tracks 25, 35, the adhesive agent is prevent from being contaminated by the impurities on the hands of a user. Therefore, as long as the characteristic adhesive ability of the adhesive agent is not lost, the fastening device of the present invention can be reused.

In the first embodiment, the openable bag 10 is manufactured through a blow film extrusion process. In detail, a tubular film is formed by extruding a melted resin through a circular slit of a circular die of an extrusion machine. In the case of double fastening structure, the rib tracks 25a, 25b, 35a and 35b and the groove track 25 and 35 to serve as the fastening device are simultaneously and integrally formed at predetermined positions on the tubular film while the tubular film is formed by the extrusion molding process.

Thereafter, the tubular film is cooled by air (upward extrusion type) or water (downward extrusion type). Continuously,

the adhesive agent 27 is applied to the bottom surface of each of the groove tracks 23 and 33. Thereafter, the tubular film is cut and welded to a predetermined length, thus forming the openable bag 10.

The above-mentioned method of forming the openable bag 10 using the air extrusion molding process has the following advantages.

First, the above-mentioned method can overcome the limitations of a film material.

In a detailed description, in conventional zipper-type bags, rail and channel elements are forcibly opened or closed by physical force. Therefore, the zipper-type bags must be made of soft materials.

Thus, most of the zipper-type bags are made of low density polyethylene (LDPE). As a result, the zipper-type bags have the disadvantages of low density polyethylene (LDPE).

That is, because the zipper-type bag must be slowly produced at low temperature by an air cooling method, the transparency of the bag is reduced. Accordingly, the zipper-type bags are used only for limited purposes.

However, in the fastening device of the present invention, because the engagement of the fasteners 20 and 30 using the adhesive agent does not physically deform the tracks, the openable bag 10 may be made of an oriented polypropylene (OPP) film which is hard and transparent. As such, the limitation of materials of conventional bags is overcome.

In the case that the tracks of the welding-type fasteners

20s and 30s are provided on the base sheet 70 by welding, but the tracks are not integrally formed on the base sheet 70, the tracks can be made of the same material as an outer film of the base sheet 70. Therefore, the material for the bag is not limited. Furthermore, the welding process can be executed regardless of the kind of single or multilayered base sheet 70.

Second, the fastening device of the present invention is very slim, thus enhancing the productivity of the bag in which the fastening device is applied.

In detail, in conventional zipper-type bags, the size of a junction part of rail and channel elements is relatively large to secure a desired fastening ability. Therefore, the conventional zipper-type bags are disadvantageous in that the opening of a zipper-type bag is thick.

The junction part of rail and channel elements is ten to twenty times thicker than the film of the zipper-type bag. Accordingly, the productivity of the zipper-type bag is reduced. The film adjacent to the junction part may be undesirably folded. When the user opens or closes the zipper-type bag, pain due to friction is caused in his/her fingers and, as well, both ends of the junction part may be broken.

However, in the fastening device of the present invention, each track is only three to four times thicker than the film of the bag 10, required for preventing the adhesive agent from being contaminated by impurities. Therefore, the present invention reduces material consumption and increases productivity. Furthermore, pain due to friction is not caused during use. As

well, both ends of a junction part of the tracks are not easily broken.

As shown in FIG. 3, in the welding-type fasteners 20s and 30s, each of the soft-touch type fasteners 20t and 30t has the predetermined depression on the rear surface thereof other than behind the welding assistant blades 77a, 77b, 87a and 87b.

The support ridges 21a, 21b, 31a and 31b are provided to support the depression. The welding assistant blades 77a, 77b, 87a and 87b are respectively welded on the fastener welding regions 37a, 37b, 57a, 57b which are provided on the films 12 and 13 of the openable bag 10 at predetermined intervals.

The left and right sides 14s and 15s and the lower end of the openable bag 10 are sealed by surface-welding. Therefore, the circumferences of the soft-touch type fasteners 20t and 30t are perfectly welded to the inner surfaces of the films 13 and 12, respectively. The depression of each of the soft-touch type fasteners 20t and 30t defines a predetermined space therein.

The predetermined spaces serve as the air capsules 22 and 32. As shown in drawings, when the soft-touch type fasteners 20t and 30t engage with each other, the air capsules 22 and 23 provides appropriate cushions. Therefore, the openable bag 10 is smoothly closed with a tiny force.

As shown in FIG. 5, in each of the reverse-opening preventing type fasteners 20r and 30r of the welding-type fasteners 20s and 30s, the welding assistant blade 77b, 87b extends to a predetermined length from a predetermined position which is spaced inward from the reverse action reference point

(SR) of a left or right side of the fastener 20r, 30r by integer multiples (d1~dx) of the width of each of the tracks. The welding-type fasteners 20s and 30s alternately engage with each other.

Referring to FIGS. 6b, 6c and 6d, when the reverse-opening preventing type fasteners 20r and 30r engage with each other, the forward action reference points (SI) of the fasteners 20r and 30r are aligned on a predetermined vertical line, but the reverse action reference points (SR) are not aligned. Therefore, forces required to open the openable bag 10 in forward and reverse directions are different from each other.

In detail, when the openable bag 10 is opened in the forward direction, the forward action reference points (SI) and force points (F) are aligned on a predetermined vertical line. Accordingly, the rib and groove tracks easily disengage from each other in regular sequence from the forward action reference points (SI). Thus, the openable bag 10 is smoothly opened.

However, in the case that the openable bag 10 is opened in the reverse direction, each force point (F) is defined at a predetermined position which is spaced apart from each of the reverse action reference points (SR) by integer multiples (d1, d2 or d3) of the width of each of the tracks. Therefore, the rib and groove tracks disengage from each other out of order from a predetermined position, but not from the reverse action reference points (SR). As the distance between each reverse action reference point (SR) and each force point (F) is great, the force applied to the fastening device is greatly dispersed. Thus, when the openable bag 10 is inverted, the contents of the openable bag 10 are

prevented from spilling out.

Furthermore, because the reverse-opening preventing type fasteners 20r and 30r alternately engage with each other, their force points (F) are not aligned. Therefore, force applied to the openable bag 10 to open it is dispersed. Thus, when force is applied to the openable bag 10 in an unexpected direction, the openable bag 10 is not easily opened.

On the other hand, as shown in FIG. 6a, even though the above-mentioned fasteners 20g and 30g having basic structures alternately engage with each other, the forward action reference points (SI) and the reverse action reference points (SR) are aligned on predetermined vertical lines. Therefore, the force required to open the openable bag 10 is the same as the case of forward and reverse directions.

In a detailed description, the fasteners 20g and 30g are the same in terms of the forward and reverse action reference points (SI) and (SR) and the force points (F). Depending on the opening direction of the openable bag 10, the groove tracks and the rib tracks sequentially disengage from each other.

When the reverse-opening preventing type fasteners 20r and 30r are welded to the films of the openable bag 10, a closed space is formed between an inner surface of each film of the openable bag 10 and each of the fasteners 20r and 30r, in the similar manner to that of the soft-touch type fasteners 20t and 30t. That is, air capsules 22 and 32 are formed.

In the above-mentioned embodiment, the welding-type fasteners 20s and 30s each are formed by the extrusion molding

method in which melted resin is continuously extruded through the die of an extrusion machine having a slit to form a tape-shaped structure. Preferably, the welding-type fasteners 20s and 30s are formed together as one set unit.

In the case of the fastener 20g, 30g having a basic structure, the associated tracks and the welding assistant blades 77a and 77b, 87a and 87b are integrally and continuously formed through the extrusion molding process.

In the case of the soft-touch type fastener 20t, 30t, the associated tracks, the welding assistant blades 77a and 77b, 87a and 87b and the support ridges 21a and 21b, 31a and 31b are integrally and continuously formed through the extrusion molding process.

In the case of the reverse-opening preventing type fastener 20r, 30r, the associated tracks and the welding assistant blades 77a and 77b, 87a and 87b are integrally and continuously formed through the extrusion molding process into the desired shape.

After the welding-type fasteners 20s and 30s are extruded in the continuous tape shape, they are preferably cooled by water (downward extrusion type). Thereafter, the adhesive agent 27 is evenly applied to the bottom surface of each of the groove tracks 23 and 33 to a predetermined thickness.

After the adhesive agents 27 are applied, the welding-type fasteners 20s and 30s are cooled and dried for a predetermined time. The completed welding-type fasteners 20s and 30s alternately engage with each other. Thereafter, the pair of welding-type fasteners 20s and 30s is wound around a reel by a winder.

The openable bag 10 is made by bag making equipment and, simultaneously, the welding-type fasteners 20s and 30s wound around the reel are welded to the predetermined portions of the openable bag 10. Then, the openable bag 10, which is easily and smoothly opened and closed and can be reused, is completed.

The integrated-type fasteners 20 and 30 or the welding-type fasteners 20s and 30s provided on the openable bag 10 are wider and thicker than fasteners of conventional zipper-type bags.

Therefore, because the junction of the rib tracks 25a and 25b and the groove track 33 is wide, the fasteners are prevented from incorrectly engaging. Thus, in the fastening device of the present invention, it is unnecessary to seal the openable bag 10 from one end of the fastening device, unlike conventional zipper-type bags. That is, even if the fastening device is closed from any position, the fastening device of the present invention can perfectly seal the openable bag 10.

As shown in FIG. 8, to close the flap-type openable bag 40, the user holds the fastener 20 provided on the flap part 47 and engages the fastener 20 with the fastener 30, which is horizontally provided on the upper part of the front film 42.

As shown in FIG. 9, to engage the fastener 20 of the flap part 47 with the fastener 30 of the front film 42, the flap part 47 having the predetermined rotational radius is folded onto the front film 42 such that the fasteners 20 and 30 meet each other.

When a part of the upper or lower rib track 35a or 35b of the fastener 30 of the front film 42 is inserted into and temporarily adhered to part of the groove track 23 of the fastener

20 of the flap part 47, a part of the upper or lower rib track 25a or 25b is also simultaneously adhered to part of the groove track 33 of the fastener 30. Here, the user has previously decided which rib track 25a or 25b, 35a or 35b to join the groove track 23, 33 to.

Thereafter, the user softly holds the predetermined part of the fastening device from which the engagement of the fasteners 20 and 30 starts, and slides his/her hand in a left or right direction or slides his/her hands in opposite directions along the fastening device. Then, the fasteners 20 and 30 engage with and temporarily adhere to each other, thus closing the flap-type openable bag 10.

Because the rib tracks 25a, 25b, 35a and 35b are very thin, it is easy to select an engagement start position between fasteners 20 and 30 from which a junction between tracks is executed, and to engage the fasteners 20 and 30 with each other. Furthermore, because the rib tracks 25a, 25b, 35a and 35b have smooth surfaces, when the fasteners 20 and 30 engage with each other, the rib tracks 25a or 25b and 35a or 35b smoothly slip into the groove tracks 23 and 33, respectively.

In the above-mentioned embodiment, the flap-type bag 40 comprises a tubular film or a flat film which is produced through the blow film extrusion process.

The flap-type bag 40 can be made of a paper, a fabric or a single or multilayered composite film without being limited to a special material.

Generally, the film constituting the flap-type bag 40 is

made of an oriented polypropylene, because the flap-type bag 40 due to the superior transparence of the oriented polypropylene has the advantage of revealing the contents of the bag. Thus, recently, the oriented polypropylene film is gaining popularity in header-type bags and glue-type bags.

In addition, in the flap-type bag 40, the fasteners 20 and 30 are integrally formed on the front and rear films 42 and 43. Therefore, the flap-type bag 40 solves problems of conventional header-type bags and glue-type bags which are feeble despite being in high demand.

In other words, the flap-type bag 40 does not require a liner which is used in a conventional bag to prevent incorrect operation and protect an adhesive agent. Because the groove tracks 23 and 33 to which the adhesive agents are applied are protected by the rib tracks 25a, 25b, 35a and 35b, the adhesive agents are prevented from being contaminated due to impurities and the hands of the user. As well, the fastening device can be nearly permanently reused without being sticky.

As shown in FIG. 10, to close the openable tray 60, the user holds one of the upper or lower tray 64 or 65 and rotates the other tray 64 or 65, having the predetermined rotational radius, around the hinge 65. Then, the fasteners 20 and 30 provided on the inner surface of the edge of the openable tray 60 engage with each other, so that the openable tray 60 is closed.

Here, the rib tracks 35a and 35b of the fastener 30 of the upper tray 64 are temporarily adhered to the respective groove tracks 23a and 23b of the fastener 20 of the lower tray 65.

Simultaneously, the groove track 33 of the fastener 30 of the upper tray 64 engages with and is temporarily adhered to the rib track 25 of the fastener 20 of the lower tray 65, thus closing the openable tray 60.

Conventional transparent or opaque openable trays have been gaining popularity due to a variety of purposes thereof. However, it is very difficult to prevent the contents of a bag from undesirably spilling out, so that the use of the bag is limited.

However, the openable tray 60 having the fastening device of the present invention can overcome the limits of use by a change in the adhesive strength of the adhesive agent.

In this embodiment, in the case that the openable tray 60 is made of the planar film sheet having a predetermined thickness, as shown in FIG. 11, the tracks of the fasteners 20 and 30 are integrally formed on the openable tray 60 through the press-molding process.

In the present invention, according to the purpose of the above-mentioned openable bag or openable tray, various single or multi track methods may be applied to the fastening device of the present invention. In other words, as shown in FIGS. 12a, 12b, 12c and 12d, the fastening device selectively has a single, double, triple or quadruple engagement structure.

As well, the adhesive strength of the adhesive agent 27 can be controlled according to the purpose of the bag.

As shown in FIG. 16, in each of the fasteners of the fastening device of the present invention, the adhesive agent 27, which is applied to the bottom surface of the groove track 23

provided between the rib track 26a and 25b, is prevented from being contaminated due to impurities or the hands of the user.

Therefore, if the adhesive agent 27 is not exposed to fine powder or fluid of a predetermined viscosity, the adhesive agent 27 nearly permanently exhibits superior adhesive ability.

As shown in FIGS. 17a, 17b and 17c, each of the fasteners 20 and 30 of the present invention has a rectangular cross-section. Alternatively, each fastener 20, 30 may have a trapezoidal or rounded cross-section.

The above-mentioned modification of the cross-sections of the fasteners 20 and 30 facilitates the engagement of the fasteners 20 and 30. According to the materials of the fasteners 20 and 30, the cross-sections of the fasteners 20 and 30 can be variously modified.

In the present invention, as shown in FIG. 17a, each track has a predetermined width and height or depth.

It has been proven through various tests that an appropriate width (w) is about 1.5mm and an appropriate height (h) or depth (d) is about 0.25mm or less. Each value may be changed according to the purpose of the bag.

In the fastener having the trapezoidal cross-section as shown in FIG. 17b, a ratio of a large width (L/w) to a small width (S/w) is 10:9 such that each sidewall of the tracks is inclined at a predetermined inclination angle, thus efficiently engaging the tracks with each other. This ratio may be changed according to the purpose of the bag having the fastener of the present invention.

As shown in FIG. 17c, the fastener having the track, each

corner of which is rounded to a predetermined radius (r), can be advantageously applied to the fastening device, such as the fastening devices of the flap-type bag and the band closure type bag. Therefore, in this case, an initial engagement between fasteners may be easily executed. It has been proven through tests that the engagement of the fasteners in this case is more smoothly executed than in other cases.

As shown in FIG. 18, in the present invention, the fastener may have the grooves at predetermined positions to prevent the overflow of the adhesive agent 27 that may occur according to the condition of the adhesive agent 27, for example, when an excessive amount of adhesive agent 27 is applied or the viscosity becomes low for some reason or other, or according to the surrounding temperature. As such, the fastener of the present invention has a double safety structure.

As shown in FIGS. 19a and 19b, both the side-furrow type grooves 24a and 24b and the vertical-furrow grooves 26a and 26b are capable of preventing the adhesive agent 27 from overflowing regardless of the shape of the groove.

As shown in FIG. 20, in consideration of the property of the adhesive agent 27 applied to the associated groove track 23, or the property of the material of the groove track 23, to firmly adhere the adhesive agent 27 to the bottom surface of the groove track 23, that is, to reinforce the weatherability meaning the ability to maintain the adhesive force, the bottom surface of the groove track 23 is uneven.

As shown in FIG. 21, in the case that the fastener is

formed in the continuous tape shape through the extrusion molding process, the linear grooves 71a may be integrally formed on the bottom surface of the groove track 23.

Other examples of the uneven surface shown in FIGS. 22a, 22b, 22c and 22d are not integrally formed on the bottom surface of the groove track 23 when the fastener is formed in the continuous tape shape through the extrusion molding process. They are formed on the bottom surface of the groove track 23 through secondary forming processes, such as a press-molding process, after the fastener is first formed through the extrusion molding process.

As described above, in the uneven surfaces having various shapes, the uneven surface is better formed through an engraving process rather than an embossed carving process. Thereafter, a predetermined amount of adhesive agent 27 is evenly applied to the uneven bottom surface of the groove track 23 to a predetermined thickness. Thus, the uneven bottom surface helps the groove track 23 evenly adhere to the rib track 35 of the opposite fastener when the associated fasteners alternately engage with each other.

To close the band closure type bag 80 of FIG. 23 after putting contents therein, the opposite band-type fasteners 93 and 95, which are respectively provided on the opposite band closures 83 and 85, and other opposite band-type fasteners 94 and 96, which are respectively provided on the opposite band closures 84 and 86, are alternately overlapped to predetermined lengths and engage with each other.

First, as shown in FIG. 24, to engage a pair of fasteners

93 and 95 with each other, the user holds, using his/her hand, the band closure 85, to which the band-type fastener 95 is welded, and faces it towards the inside. Thereafter, the user overlaps the band closure 83, to which the band-type fastener 93 is welded, onto the band closure 85 to a predetermined length using the other hand. Then, the band-type fasteners 93 and 95 alternately engage with each other.

Thereafter, the other pair of fasteners 94 and 96 engage with each other in the same manner as the engagement of the fasteners 93 and 95. Then, the band closure type bag 80, in which the contents are received, is safely closed.

That is, as shown in FIG. 25, the plurality of groove tracks 23a-z and rib tracks 25a-z of each of the band-type fasteners 93 and 96 alternately engage with the plurality of groove tracks 33a-z and rib tracks 35a-z of each of the corresponding band-type fasteners 94 and 95, thus reliably closing the band closure type bag 80.

At this time, due to the difference of the height or depth between the tracks, the tracks serve as stoppers with respect to each other. Therefore, the fasteners 93 and 95, 94 and 96 engaging with each other can withstand a lateral force applied to the band closures 83 and 85, 84 and 86, thus firmly maintaining the engagement of the fasteners 93 and 95, 94 and 96.

Therefore, the fastening device of this embodiment solves problems in that band closures lengthen or tear when the band closures are forcibly tied, or a separate tape is required to close an opening of a bag.

In this embodiment, the band-type fasteners 93, 94, 95 and 96 are integrally formed on the band closures 83, 84, 85 and 86 by heat welding, or adhered to the band closures 83, 84, 85 and 86 by adhesive agents having high adhesive abilities, respectively.

As shown in FIG. 27a and 27b, in the band-cell type fastener 100 according to the modification of the present invention, the pair of band-cell type fasteners 100 engaging with each other can accomplish a structure capable of withstanding lateral forces which are applied to the fasteners 100 in longitudinal and latitudinal directions.

In a detailed description, the plurality of cells, which serves as the rib and groove tracks each having a predetermined size, height and shape, is intermittently provided on the surface of the band base 107 at predetermined intervals.

For example, each cell may have a circular, rectangular or other shape, as shown in FIGS. 26a and 26b.

One band-cell type fastener 100 has an intermittent structure in which the cells are spaced apart from each other. However, the fastening device, in which the pair of band-cell type fasteners 100 engages with each other, has a continuous structure in that the cells are continuous along the X-axis and the Y-axis. Here, due to the difference in the height or depth between the rib cells 105 and the groove cells 103, the cells serve as stoppers with respect to each other.

As such, because the cells adhere to and engage with each other, the engagement between the band-cell type fasteners 100 can withstand a force applied from any lateral direction. In addition,

the band-cell type fastener 100 disperses the force applied from the outside throughout the fastener 100, thus safely maintaining the engagement between the fasteners 100.

Such band-cell type fastener 100 may be used on an adhesive band of an object, such as a diaper (not shown), for which frequent movement and reattachment are required.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention.

Therefore, the accompanying claims comprehensively include all modifications corresponding to the scope and spirit of the invention.

As such, in the present invention, the rib tracks and the associated groove tracks alternately engage with each other while reliably adhering to each other due to the adhesive agent having the predetermined adhesive strength. Thus, the present invention can be used to smoothly open and close openings of various containers, such as bags. Furthermore, it is possible to firmly seal a bag using only slight force, thus being convenient to a user. As well, the adhesive agent has strong adhesive strength and is not exposed to impurities or the hands of the user. Therefore, the fastening device of the present invention can be reused nearly forever. In addition, the present invention overcomes the limit of materials for the fastening device, thus being widely applied to various kinds of products. Moreover, because the fastening device

of the present invention has a slim structure, it has various advantages from manufacturing and functional point of views, compared with conventional fastening devices.

Industrial Applicability

As described above, the present invention provides a fastening device with **adhesive** fasteners having rib and groove tracks which is used to open and close various containers and bags to receive contents therein, and has a slim structure, thus being convenient to a user. Furthermore, the fastening device of the present invention may be used on an adhesive band of an object, such as a diaper, for which frequent movement and reattachment are required.